Jigs and Tools Used in Making Pipe and Other Wrenches

By Ethan Viall

SYNOPSIS—While the methods of machining these wrench parts may vary some with different-sized members of the same group, yet the work shown is well standardized. Most of the jigs are simple and easily operated for the removal or insertion of work.

In making the class of small tools described in this article not only must they be well designed and nicely balanced, but tools and jigs must be provided for making commercially accurate and interchangeable parts in an economical manner. These tools and jigs must not be so difficult to make nor so highly finished as to eat up too large a percentage of the profits. These fundamental conditions seem to have been well met by the Mechanics Tool Co., Rockford, Ill., in its factory equipment and product.

The product consists of a varied line of pipe wrenches, pliers, nippers, nail cutters, end wrenches and the like. Each kind of tool is made in sizes sufficient to meet almost every conceivable requirement. A fair idea of the class of tools made may be had by reference to Fig. 1, where six varieties and several sizes are shown. The ones at the left are known as eagle-claw wrenches and may be used for a large number of purposes. Some of their applications are illustrated in Fig. 2 and will be readily understood. While these special wrenches have many different forms and sizes, the general principle on which they are made is the same. Other tools shown differ only in minor details from many with which the reader is already familiar. All the handles or principal parts of these tools are drop forged from a suitable grade of steel. A few of the forgings, with the flask still in place, may be seen in Fig. 3.

In describing the work on some of these tools we will begin with pipe wrenches of the more common sort, shown at the top in the first illustration. The adjustable jaws for these wrenches are made in two ways. The larger sizes are drop forged in a die that also forms the thread on the stem for the adjusting nut. On some of the smaller sizes the stem is forged round and afterward hollow-milled and threaded. The hollow milling is done with a self-opening die head like the one seen at the left in Fig. 4. This is a regular thread-cutting head fitted with milling jaws, as shown. The head is held on the spindle of a heavy drilling machine, and the work to be milled is fastened to the table by a two-jawed universal chuck fitted with formed false jaws. After being hollow-milled, the work is placed in a jig like that shown at the right, and a hole is drilled lengthwise of the stem. In this jig the work is placed with the milled stem in a vertical V-groove and is clamped in place by the ring clamp *A*, which is removed, for the insertion or removal of the work, by slip-

FIG. 1. A FEW OF THE WRENCHES MADE

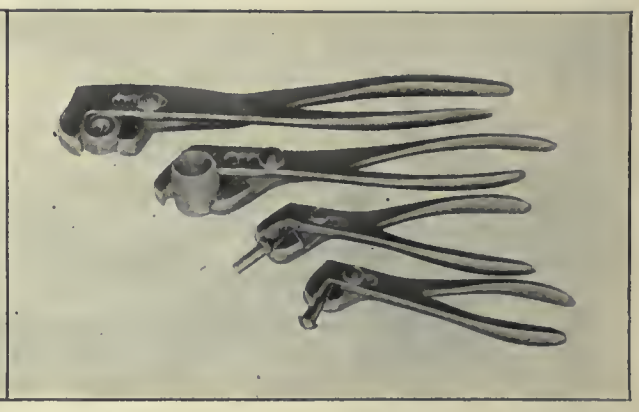


FIG. 2. METHODS OF GRIPPING WITH CLAW WRENCH

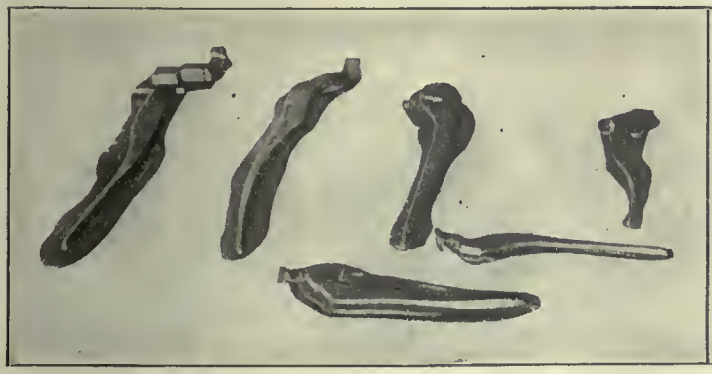


FIG. 3. DROP-FORGED WRENCH PARTS

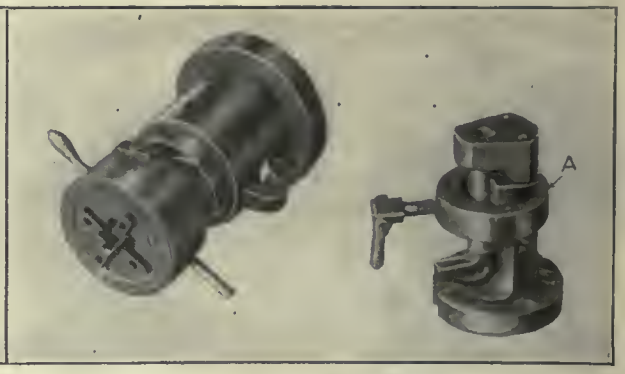


FIG. 4. DIE HEAD USED AS A MILL, AND A DRILLING JIG

ping it up off the jig. Another form of jig for this same work will be shown later. After these pieces have been milled and drilled, they are threaded for the adjusting nut, using a self-opening die head and holding the work exactly as for hollow-milling.

All the adjustable jaws for pipe wrenches are drilled lengthwise of the stem, whether they come with the threads ready forged on them or not. After they are drilled, they are placed in a jig, Fig. 5, and a slot is milled lengthwise so as to cut through into the drilled hole. As can be seen, the wrench jaw is placed with the drilled hole over the end of the slotted tail center *A*, and the head end *B* is held between the formed jaws of a chuck. The setscrew *C* forces the work solidly against the tail center and prevents any tendency to work loose during the cut.

The next operation on these adjustable jaws is to mill the "teeth" in them. This is done by placing the work in a vise fitted as shown at the right in Fig. 6. The work *A* is placed against the grooved vertical post *B* and locked in by turning the handle *C*. The teeth are then milled at *D* with a formed mill.

The recess for the adjusting nut is finished in a gang jig, seen in the foreground in Fig. 6. The number milled at a time depends on the size, as various holding jigs are provided. In the one shown, twelve are placed at a time, and a milling cutter is run through at *E*. The teeth on the contact end are milled with a formed mill held in a vertical spindle. Some are milled in gangs, while the larger ones are milled one at a time, held as at *F*.

The large sizes of pipe wrenches have steel pieces inserted in the contact ends of the backs, as at *A*, Fig. 7. These inserted pieces are shaped as shown at *B*. The pin hole in the back is drilled in the jig seen at the back, and the pin hole in the inserted piece is drilled as at *C*. The operation of both of these jigs is apparent.

In the type of pipe wrench just shown it is necessary, in order that a good grip may be obtained, for the ad-

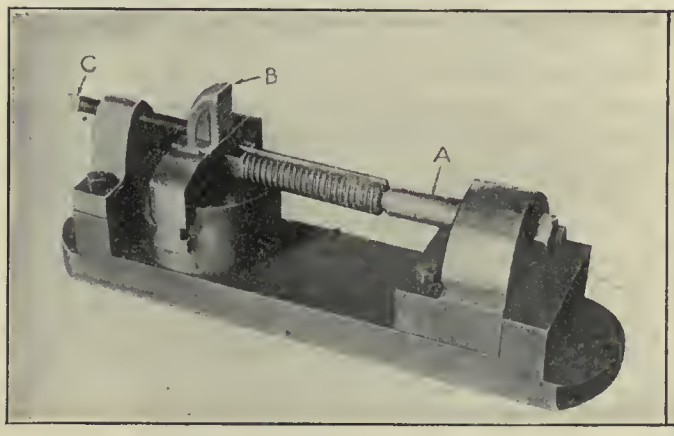


FIG. 5. JAW SLOT-MILLING JIG

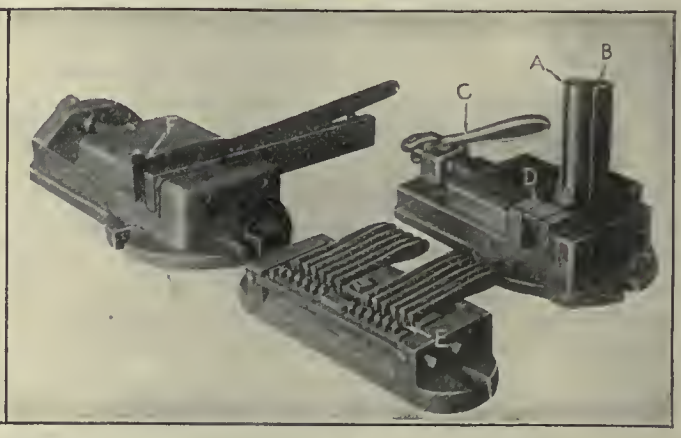


FIG. 6. THREE MILLING JIGS

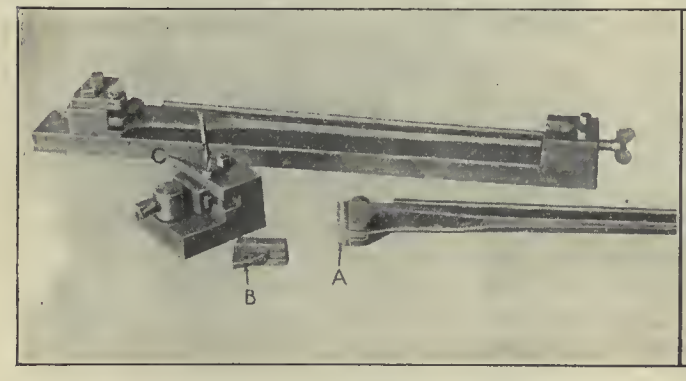


FIG. 7. LARGE WRENCH JIGS

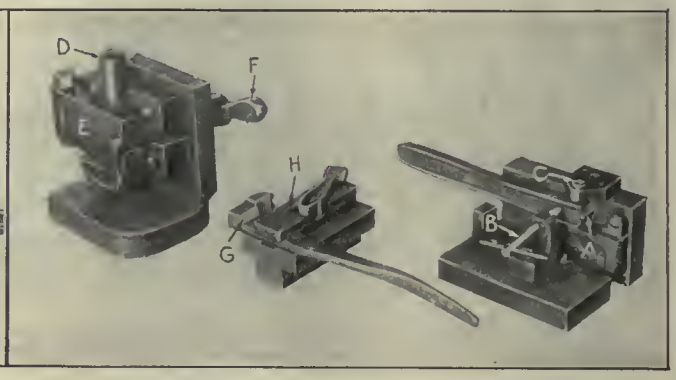


FIG. 8. TWO DRILLING AND A MILLING JIG

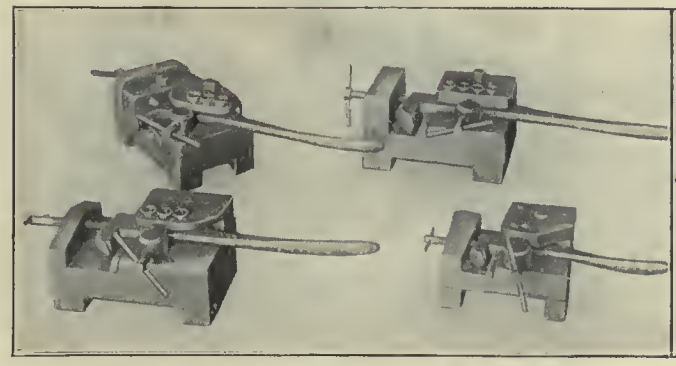


FIG. 9. JIGS FOR PIVOT-SHIFTING HOLES

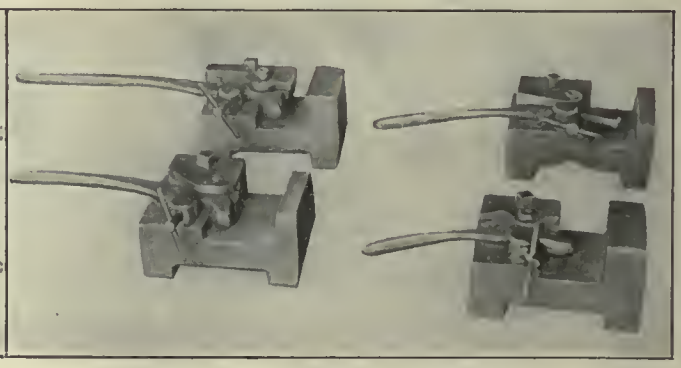


FIG. 10. PIVOT PIN HOLE JIGS

justable jaw to be held back until a grip is taken on the pipe. This is done by inserting a small coil spring between the jaw stem and the back of the handle. The hole for this spring is drilled as shown at the right in Fig. 8. The handle is placed in the jig and butted against the pin *A*. The clamp screw *B* is then tightened, and the hole is drilled through the bushing *C*.

At the left in this illustration is shown another jig for holding the adjustable jaw while drilling the hole

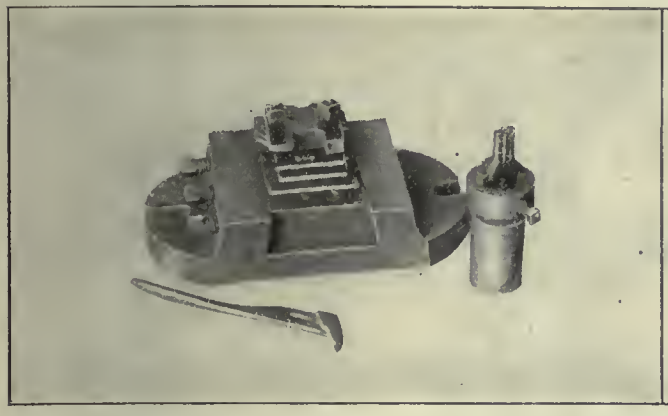


FIG. 11. PUNCH AND DIE FOR SMALL SHIFTING HOLES

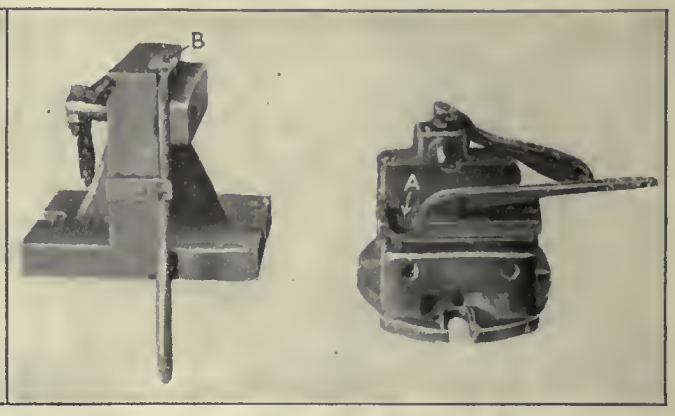


FIG. 12. JAW-TOOTH MILLING JIGS

lengthwise of the stem. This jig differs considerably from the one first shown and is a type used mostly on the larger sizes. A simple cap with a bushed hole in it is used to center with, and then the hole is drilled in the usual way. The piece *D* is placed in the jig in a vertical V-groove, and then the hinged clamp *E* is swung into place and locked by means of the bolt and eccentric lever *F*.

In the middle in Fig. 8 is a simple milling jig for holding eagle-claw backs while milling a cut at *G* to give the proper finish and clearance. The wrench back is located by means of the rivet holes drilled in it, which fit over pins in the jig. The clamp *H* is slotted so as to slide

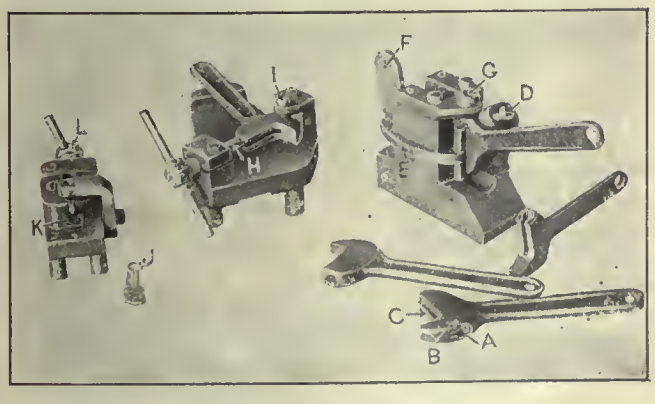


FIG. 13. END WRENCH JIGS

forward or back under its retaining bolt and is locked when in position by a screw operated by the lever.

These plier-like claw wrenches are all made so that the pivoting point may be shifted to two or more positions. This arrangement gives each wrench considerable range in firm gripping within its capacity. The principle of a flattened pivot pin and several pivot holes connected by slots narrower than the holes, on which this shifting is based, is familiar to all readers. The jigs for drilling the shift holes are illustrated in Fig. 9. All are made on the same plan, and they differ only in the number of holes to be drilled and the size or angle of the wrench back. The gripping jaws carry the pivot pin and in consequence have but one hole drilled in them. The type of jig used is seen in Fig. 10.

On a few of the smaller sizes the shifting holes are punched instead of being drilled. This is done with the punch and die shown in Fig. 11. Teeth on the jaws of the claw wrenches are milled as in Fig. 12. The jig at the right is for wrench backs, and the one at the left is for the gripping jaws. While these jigs are for but one size, the jigs for the others are of practically the same design and differ merely in variations of the holding blocks or jaws. The teeth at *A* and *B* are milled with formed cutters, as on the pipe wrenches.

Adjustable end-wrench body forgings are first milled across the ends for the jaws, then a hole *A*, Fig. 13, is drilled through for the adjusting screw. The retaining-pin hole *B* is drilled, and next a slot is sawed out at *C*. The first milling operation is an ordinary one, so need not be shown. The screw hole is drilled in the jig seen at the right. The forging is located in the jig by thrusting the milled surface against a block and tightening the setscrew *D*. Side motion is prevented by a wedge clamp *E* operated by the wedge lever *F*. The hole is then drilled down through the bushing *G*.

The retaining-pin hole is drilled in the middle jig. The forging is located between a stationary pin and an adjustable clamping pin *H*, and the hole is drilled through the bushing *I*.

The movable jaw for the end wrench has a hole *J* drilled in it which is done in the jig at the left. The piece is held in the jig in formed jaws *K*, which are pivoted near the middle; and the work is held by the wedging and spreading action of the pointed screw *L* at the back.

Sawing Out the Slot

The slot in which the movable jaw slides is cut out in a special machine, Fig. 14, made by the Mechanics Machine Co. The forging is held in practically the same way as in the screw-hole drilling jig. The setscrew is carried in a yoke *A*, and the wedging lever operating the side-clamping jaws is shown at *B*. The slot is cut with the saw *C*, which is worked by means of a crank motion. Feed is obtained through levers and a weight *D*, to which a spring is also attached. Means are provided for automatically stopping the machine at the proper depth of cut. When removing or inserting work, the saw is held up out of the

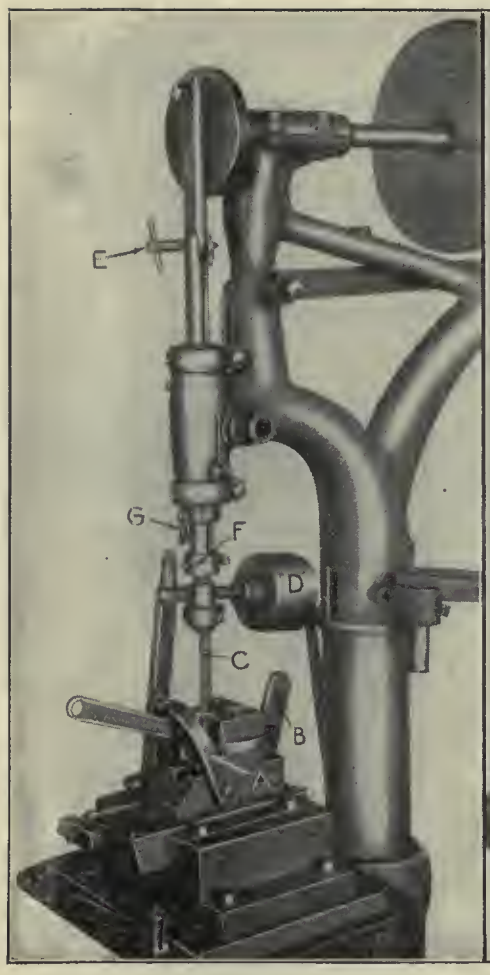


FIG. 14. SLOT-SAWING MACHINE

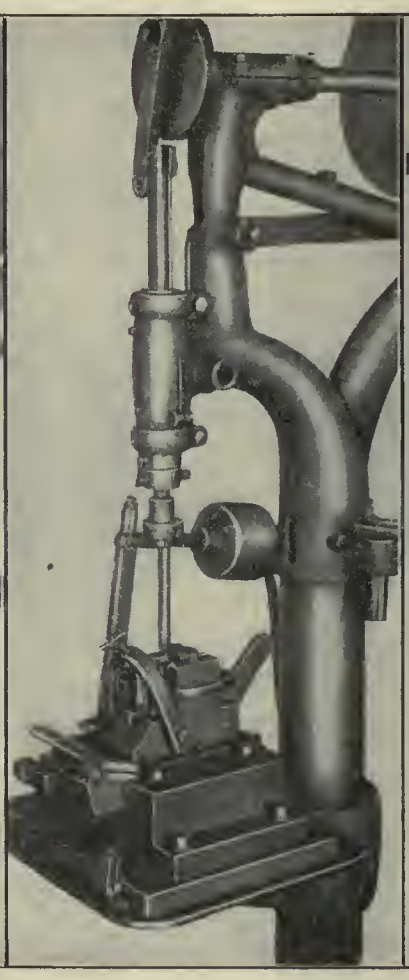


FIG. 15. MACHINE EMPTY

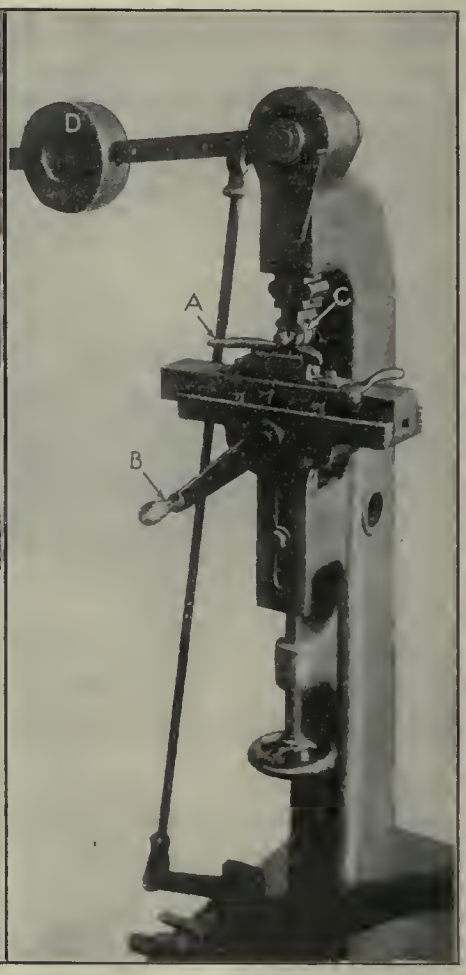


FIG. 16. LETTERING MACHINE

way by first pulling out the pin *E* and then catching the spindle pin *F* in latch *G*. The machine with the work removed and the spindle locked in the upward position, as described, is illustrated in Fig. 15.

Names are rolled into wrench forgings in the machine seen in Fig. 16, which was also made by the Mechanics Machine Co. The forging is placed at *A* and the lettering rolled in by turning the crank *B*, which causes the table to move and traverse the work under the lettering roll *C*. The right pressure to obtain even lettering is obtained by the lever and weight *D*, which may be adjusted to suit the work in hand. The weight and roll are lifted to clear the work by depressing the foot treadle.

Teaching the Munition-Making Trades as a War Measure

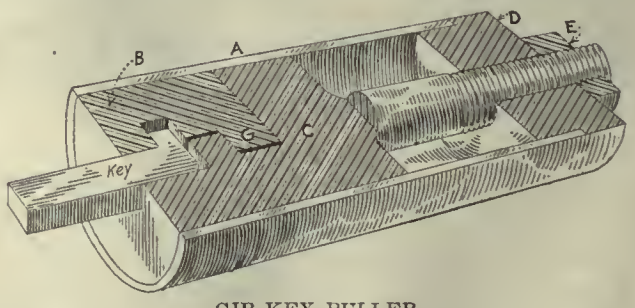
Interesting reports of the effects of the war on English shops and English workmen include the forming of classes for training workers in munition factories. These, it is understood, are being conducted by the London County Council and other similar bodies in various manufacturing centers and at the request of the Ministry of Munitions. The instruction is given to both machine operators and tool setters, the former predominating, as would be expected. Various branches of the trade are taught, including general machine work, such as is found on shells and fuses; lead burning, which is almost a lost art in some sections; and tool setting, as distinguished from machine operation.

Women are also being trained in some trades. Many seem to be taking up the occupation of tracing in drafting rooms and are said to be making marked progress.

A Gib-Key Puller

By J. A. Moffat

A gib-key puller is shown in the illustration. It consists of a sleeve *A*, made from iron pipe; a member *B*, which holds the key; and the puller *C*, with a tongue *G* which engages *B*. The washer *D* rests on one end of the sleeve *A*. The other end of the sleeve rests on the hub of the pulley. When the nut *E* is screwed down, the key puller and the key are drawn through the sleeve. For handling different sizes of keys the member *B* is the only part that need be changed.



GIB-KEY PULLER